

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DAVID L. CHAPEK

Appeal 2006-2669
Application 09/605,293¹
Technology Center 2800

Decided: September 21, 2007

Before ALLEN R. MACDONALD, JAY P. LUCAS,
and SCOTT R. BOALICK, *Administrative Patent Judges*.

BOALICK, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) from the rejection of claims 9-12 and 14, all the claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

¹ Application filed June 28, 2000. The real party in interest is Micron Technology, Inc.

STATEMENT OF THE CASE

Appellant's invention relates to a semiconductor device having a layer of silicon dioxide that has been pretreated with hydrogen ions so that a polycrystalline film can be deposited smoothly and uniformly on the pretreated silicon dioxide layer. (Specification 1:1-3; 2:27 to 3:1.)

Claim 9 is exemplary:

9. A semiconductor device precursor comprising:
 - a semiconductor substrate;
 - a layer of silicon dioxide formed on said semiconductor substrate, the surface of said layer of silicon dioxide having been doped with hydrogen ions deposited by a plasma source ion implantation process, wherein said layer of silicon dioxide is free of sputtered metal contaminants; and
 - a layer of polycrystalline silicon formed on said layer of silicon dioxide, said layer of polycrystalline silicon having a smooth morphology.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Applicant's admitted prior art, pages 1-2 of the Specification under the heading "BACKGROUND OF THE INVENTION"

Murata US 5,576,229 Nov. 19, 1996

Burns, Stanley G., "Principles of Electronic Circuits, pp. 177 and 308-381.

Claims 9-12 and 14 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

Claims 9 stands rejected under 35 U.S.C. § 102(a) as being anticipated by the Applicant's admitted prior art (AAPA).

Claims 10-12 stand rejected under 35 U.S.C. § 103(a) as being obvious over Burns and the AAPA.

Claim 14 stands rejected under 35 U.S.C. § 103(a) as being obvious over Murata and the AAPA.

Rather than repeat the arguments of Appellant or the Examiner, we make reference to the Briefs and the Answer for their respective details. Only those arguments actually made by Appellant have been considered in this decision. Arguments which Appellant could have made but chose not to make in the Briefs have not been considered and are deemed to be waived.

*See 37 C.F.R. § 41.37(c)(1)(vii) (2004).*²

ISSUES

1. Whether Appellant has shown that the Examiner erred in rejecting claims 9-12 and 14 for indefiniteness under 35 U.S.C. § 112, second paragraph. The issue turns on whether one skilled in the art would understand the claim limitation "free of sputtered metal contaminants" when read in light of the specification.

² Except as will be noted in this opinion, Appellant has not presented any substantive arguments directed separately to the patentability of the dependent claims or related claims in each group. In the absence of a separate argument with respect to those claims, they stand or fall with the representative independent claim. *See 37 C.F.R. § 41.37(c)(1)(vii).*

2. Whether Appellant has shown that the Examiner erred in rejecting claim 9 under 35 U.S.C. § 102(a). The issue turns on whether the AAPA teaches or discloses each and every limitation of claim 9.

3. Whether Appellant has shown that the Examiner erred in rejecting claims 10-12 under 35 U.S.C. § 103(a). The issue turns on whether the AAPA and Burns teach or disclose the claimed subject matter.

4. Whether Appellant has shown that the Examiner erred in rejecting claim 14 under 35 U.S.C. § 103(a). The issue turns on whether the AAPA and Murata teach or disclose the claimed subject matter.

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

1. Appellant describes semiconductor devices that are made using a method for pre-treating a silicon dioxide film with hydrogen ions that provides a subsequently deposited polycrystalline silicon film with a smooth morphology. (Specification Abstract; 1:1-3.) In particular, the method involves using a plasma source ion implantation (PSII) technique to pre-treat the silicon dioxide film with hydrogen ions. (Specification 8:16 to 9:16.)

2. In the "Background of the Invention" section, the Specification states that:

Currently in the art, silicon dioxide films are pretreated with hydrogen ions to prepare the surface of the silicon dioxide film for the deposition of a layer of polycrystalline silicon to provide for a thinner and smoother polycrystalline silicon film. The silicon dioxide is pretreated by ion beam bombardment by a Kaufman ion source. Hydrogen ion beam pretreatment is typically performed using a Kaufman ion beam source directed normally to the substrate. A Kaufman ion source employs a metal grid to accelerate ions at a particular target. During an ion implantation process using a Kaufman ion source, metal from the metal grid sputters off of the grid and becomes implanted in the target object causing the target object to become contaminated. As the size of devices on the target object decreases, the effect of damage caused by sputtered metal from the metal grid increases.

(Specification 1:12-22.)

3. The Specification also states that:

Unlike a Kaufman ion source implantation technique, a plasma source ion implantation apparatus does not employ a metal grid to accelerate the hydrogen ions toward the target object but instead uses the target object itself, in this case the substrate 12, to accelerate the ions toward the target object. Thus, plasma source ion implantation reduces the possibility of contamination of the target object by eliminating a device which employs a metal grid. Further, plasma source ion implantation can be used on smaller devices or substrates than a Kaufman ion

source without increasing the likelihood for contamination of the target object.

(Specification 10:6-13.)

PRINCIPLES OF LAW

On appeal, all timely filed evidence and properly presented argument is considered by the Board. *See In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984).

In the examination of a patent application, the Examiner bears the initial burden of showing a *prima facie* case of unpatentability. *Id.* at 1472, 223 USPQ at 788. When that burden is met, the burden then shifts to the applicant to rebut. *Id.*; *see also In re Harris*, 409 F.3d 1339, 1343-44, 74 USPQ2d 1951, 1954-55 (Fed. Cir. 2005) (finding rebuttal evidence unpersuasive). If the applicant produces rebuttal evidence of adequate weight, the *prima facie* case of unpatentability is dissipated. *In re Piasecki*, 745 F.2d at 1472, 223 USPQ at 788. Thereafter, patentability is determined in view of the entire record. *Id.* However, on appeal to the Board it is an appellant's burden to establish that the Examiner did not sustain the necessary burden and to show that the Examiner erred -- on appeal we will not start with a presumption that the Examiner is wrong.

The purpose of the second paragraph of 35 U.S.C. § 112 "is to provide those who would endeavor, in future enterprise, to approach the area circumscribed by the claims of a patent, with the adequate notice demanded by due process of law, so that they may more readily and accurately determine the boundaries of protection involved and evaluate the possibility of infringement and dominance." *In re Hammack*, 427 F.2d 1378, 1382, 166

USPQ 204, 208 (CCPA 1970). The test for definiteness under the second paragraph of 35 U.S.C. § 112 is "whether those skilled in the art would understand what is claimed when the claim is read in light of the specification." *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576, 1 USPQ2d 1081, 1088 (Fed. Cir. 1986).

Anticipation is established when a single prior art reference discloses expressly or under the principles of inherency each and every limitation of the claimed invention. *Atlas Powder Co. v. IRECO Inc.*, 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1946 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1478-79, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994).

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734, 82 USPQ2d 1385, 1391 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, and (3) the level of skill in the art. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966). *See also KSR*, 127 S. Ct. at 1734, 82 USPQ2d at 1391 ("While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls."). The Court in *Graham* further noted that evidence of secondary considerations, such as commercial success, long felt but unsolved needs, failure of others, etc., "might be

utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." 383 U.S. at 18, 148 USPQ at 467.

During examination of patent application, a claim is given its broadest reasonable construction consistent with the specification. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969). "[T]he words of a claim 'are generally given their ordinary and customary meaning.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312, 75 USPQ2d 1321, 1326 (Fed. Cir. 2005) (en banc) (internal citations omitted). The "ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id.* at 1313, 75 USPQ2d at 1326.

A product-by-process claim enables "an applicant to claim an otherwise patentable product that resists definition by other than the process by which it is made." *In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985). "To the extent these process limitations distinguish the *product* over the prior art, they must be given the same consideration as traditional product characteristics." *In re Luck*, 476 F.2d 650, 653, 177 USPQ 523, 525 (CCPA 1973).

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself." *Id.* In other words, "once a product is fully disclosed in the art, future claims to that same product are precluded, even if that product is claimed as made by a new process." *Smithkline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1315, 78 USPQ2d 1097, 1099 (Fed. Cir. 2006).

"Where a product-by-process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product." *In re Marosi*, 710 F.2d 799, 803, 218 USPQ 289, 292-93 (Fed. Cir. 1983).

ANALYSIS

Appellant contends that Examiner erred in rejecting claims 9-12 and 14. Reviewing the documents of record and the findings of facts cited above, we do not agree that the Examiner erred in rejecting claims 9-12 and 14 as being indefinite. However, we agree with Appellant that the Examiner erred in rejecting claim 9 as being anticipated by the AAPA, claims 10-12 as being obvious over Burns and the AAPA, and claim 14 as being obvious over Murata and the AAPA.

Issue 1: Indefiniteness Rejection of Claims 9-12 and 14

The Examiner found that the recited limitation of a silicon dioxide layer (claims 9-12) or a semiconductor substrate (claim 14) "free of sputtered metal contaminants" rendered the claims indefinite. (Answer 5.) Appellant argues that the Examiner erred in finding claims 9-12 and 14 indefinite because:

the specification clearly describes the problem of sputtered metal contaminants resulting from the use of a Kaufmann ion source which includes a metal grid (see page 1), and teaches that using PSII reduces metal contamination because it eliminates the use of a metal grid (page 10). In light of this

teaching in the specification, it is submitted that one of ordinary skill in the art would understand that the limitation "free of sputtered metal contaminants" means that the layer of silicon dioxide has no sputtered metal contaminants present.

(Reply Br. 2; *see also* Br. 5-6.) Appellant contends that the claim term "free of sputtered metal contaminants" does not require that the layer (or substrate in claim 14) be free from all metal contaminants, just *sputtered* metal contaminants. (Br. 6.)

We agree with the Examiner that the limitation "free of sputtered metal contaminants" renders claims 9-12 and 14 indefinite. (Answer 5, 10-12.) The Examiner found that "free" is a relative term "because accepted physics principles dictate that no material will be completely free of metal contaminants." (Answer 5.) Therefore, the Examiner found that "in the context of the claims, one of ordinary skill in the art would not know what level of contaminants is required to meet the limitation." (Answer 5.) We agree with the Examiner that the Specification "does not define any standard for determining the level of contaminants present" and "does not provide any objective standard for the relative term such that one of ordinary skill in the art would not know what level of contaminants is needed to be considered 'free.'" (Answer 5.)

We agree with the Examiner that "Appellant merely points out that their process eliminates one specific source of sputtered metal contaminants (the metal grid in the Kaufman ion source)" so as to reduce but not eliminate the possibility of sputtered metal contamination. (Answer 10.) We also agree with the Examiner that Appellant's reliance on *In re Marosi*, 710 F.2d

199, 218 USPQ 289 (Fed. Cir. 1983) is misplaced. (Answer 11.) The *Marosi* court found that the claim limitation "essentially free of alkali metal" was not indefinite because the specification provided a general guideline and examples sufficient to enable a person of ordinary skill in the art to draw a line between unavoidable impurities in starting materials and essential ingredients. *Id.* at 803, 218 USPQ at 292. Unlike *Marosi*, the instant Specification provides no general guideline or examples sufficient to enable a person of ordinary skill in the art to draw a line and determine if the limitation "free of sputtered metal contaminants" is satisfied.

In addition, the Examiner found that there would be no difference between the structure of a sputtered metal contaminant and the structure of other metal contaminants in the devices claimed by claims 9-12 and 14. (Answer 12.) Therefore, the Examiner found that a person of ordinary skill in the art would not be able to determine whether a contaminant in the claimed devices "was sputtered or introduced in another way." (Answer 12.)

Appellant has not come forward with evidence to rebut the Examiner's findings. Appellant merely alleges that, in light of the teachings in the Specification regarding Kaufman ion sources and PSII (*see* FF 2-3), one of ordinary skill would understand that the limitation "free of sputtered metal contaminants" means that no sputtered metal contaminants are present. (Reply Br. 2.) However, "[a]rgument in the brief does not take the place of evidence in the record." *In re Schulze*, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965) (citing *In re Cole*, 326 F.2d 769, 773, 140 USPQ 230, 233 (CCPA 1964)).

Therefore, we conclude that the Examiner did not err in rejecting claims 9-12 and 14 as indefinite under 35 U.S.C. § 112, second paragraph.

Issue 2: Anticipation Rejection of Claim 9

The Examiner found that "[t]he admitted prior art does not explicitly state the layer of silicon dioxide being 'free of sputtered metal contaminants' but this limitation is considered implicitly understood." (Answer 6.) The Examiner interpreted the limitation "free of sputtered metal contaminants" to mean "sufficiently free so as to operate." (Answer 6-7.) Therefore, the Examiner found that claim 9 was written broadly enough to read on a conventional layer of silicon dioxide treated with hydrogen ions using a Kaufman ion source. (Answer 7; 13.) In addition, the Examiner found that "[s]ince the claims are drawn to a product, the process by which the contamination is introduced is immaterial since the final structure of a metal contaminant is the same regardless of how it got there. Thus, any number of metal contaminants is encompassed by the claimed device." (Answer 14.)

Appellant argues that the limitation "free of sputtered metal contaminants" should not be interpreted "as encompassing a layer which *includes* sputter [sic, sputtered] metal contaminants as a result of treatment with a Kaufman ion source as described in 'Applicant's admitted prior art.'" (Reply Br. 3; *see also* Br. 7.) We agree.

The Specification teaches that the use of a Kaufman source results in metal sputtering off the metal grid and contaminating the target object. (FF 2.) Therefore, it is not consistent with the Specification to interpret the claim limitation "free of sputtered metal contaminants" in such a way that enables it to be met by a silicon dioxide layer (or semiconductor substrate) that explicitly encompasses sputtered metal contaminants introduced through the use of a Kaufman source.

Therefore, we conclude that the Examiner erred in rejecting claim 9 as anticipated by the AAPA.

Issues 3 & 4: Obviousness Rejections of Claims 10-12 and 14

In rejecting claims 10-12 and 14, the Examiner relied on the AAPA for a teaching of a layer of silicon dioxide (or a semiconductor substrate in claim 14) that is "free of sputtered metal contaminants." (Answer 7-10, 15, and 17.) However, as discussed with respect to claim 9, it is not consistent with the Specification to interpret the claim limitation "free of sputtered metal contaminants" in such a way that enables it to be met by a silicon dioxide layer (or semiconductor substrate) that explicitly encompasses sputtered metal contaminants introduced through the use of a Kaufman source.

Therefore, we conclude that the Examiner erred in rejecting claims 10-12 as being obvious over AAPA and Burns and erred in rejecting claim 14 as being obvious over AAPA and Murata.

NEW GROUNDS OF REJECTION UNDER 37 C.F.R. § 41.50(b)

We make the following new grounds of rejection using our authority under 37 C.F.R. § 41.50(b).

35 U.S.C. § 112, First Paragraph

Claims 9-12 and 14 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the Specification in such a way as to reasonably convey to one skilled in the

relevant art that the inventor, at the time the application was filed, had possession of the claimed invention.

Claims 9-12 and 14 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 9-12 recite the limitation "wherein said layer of silicon dioxide is free of sputtered metal contaminants" and claim 14 recites the limitation "wherein said semiconductor substrate is free of sputtered metal contaminants." These limitations were added by amendment after the filing date of the instant Specification.

The Specification provides no special meaning for the claim term "free of sputtered metal contaminants."³ The plain meaning of the claim term "free of" is "lacking; without." *Webster's New World Dictionary Third College Edition* 537 (1994). The originally-filed Specification does not teach or describe a device that is lacking or without sputtered metal contaminants. Instead, the Specification describes a semiconductor device made by a process that *reduces* the possibility of contamination when compared to the prior art Kaufman ion source implantation technique. (FF 3.) In particular, the Specification teaches that the possibility of contamination is reduced because the metal grid used by the Kaufman ion source technique is not present. (FF 3.) The Specification also teaches that the process used to make the device can be used on smaller devices than a Kaufman ion source *without increasing* the likelihood of contamination.

³ Indeed, the Specification never uses the term "free of."

(FF 3) In other words, the Specification teaches a device where the possibility of sputtered metal contamination is *reduced*, not *eliminated*. Although the Specification teaches removal of one source of sputtered metal contamination to reduce the possibility of contamination, the Specification does not teach removal of all possible sources of sputtered metal contamination. The originally-filed Specification simply contains no teaching or description of a device free of (i.e., without any) sputtered metal contaminants.

Accordingly, the originally-filed Specification lacks both written description and enablement for the limitation "wherein said layer of silicon dioxide is free of sputtered metal contaminants" recited by claims 9-12 and for the limitation "wherein said semiconductor substrate is free of sputtered metal contaminants" recited by claim 14.

This decision contains new grounds of rejection pursuant to 37 C.F.R. § 41.50(b) (effective September 13, 2004, 69 Fed. Reg. 49960 (August 12, 2004), 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)).

37 C.F.R. § 41.50(b) provides that, "new ground[s] of rejection pursuant to this paragraph shall not be considered final for judicial review."

37 C.F.R. § 41.50(b) also provides that the Appellants, *WITHIN TWO MONTHS FROM THE DATE OF THE DECISION*, must exercise one of the following two options with respect to the new grounds of rejection to avoid termination of proceedings (37 C.F.R. § 1.197 (b)) as to the rejected claims:

- (1) Reopen prosecution. Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected,

or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner ...

(2) Request rehearing. Request that the proceeding be reheard under 37 C.F.R. § 41.52 by the Board upon the same record ...

CONCLUSION OF LAW

Based on the findings of facts and analysis above, we conclude that:

(1) The Examiner did not err in rejecting claims 9-12 and 14 for indefiniteness under 35 U.S.C. § 112, second paragraph.

(2) The Examiner erred in rejecting claim 9 for anticipation under 35 U.S.C. § 102(a).

(3) The Examiner erred in rejecting claims 10-12 for obviousness under 35 U.S.C. § 103.

(4) The Examiner erred in rejecting claim 14 for obviousness under 35 U.S.C. § 103.

(5) Claims 9-12 and 14 are unpatentable under 35 U.S.C. § 112, first paragraph, because they fail to comply with the written description requirement.

(6) Claims 9-12 and 14 are unpatentable under 35 U.S.C. § 112, first paragraph, because they fail to comply with the enablement requirement.

DECISION

The rejection of claims 9-12 and 14 for indefiniteness under 35 U.S.C. § 112, second paragraph, is affirmed.

The rejection of claim 9 for anticipation under 35 U.S.C. § 102(a) is reversed.

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The rejection of claim 10-12 for obviousness under 35 U.S.C. § 103 is reversed.

The rejection of claim 14 for obviousness under 35 U.S.C. § 103 is reversed.

Claims 9-12 and 14 are rejected for failure to comply with the written description requirement of 35 U.S.C. § 112, first paragraph.

Claims 9-12 and 14 are rejected for failure to comply with the enablement requirement of 35 U.S.C. § 112, first paragraph.

New grounds of rejection have been entered under 37 C.F.R. § 41.50(b).

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED
37 C.F.R. § 41.50(b)

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